Production and study of super-heavy nuclei at GANIL

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In recent years, experiments on the production of super-heavy nuclei have been undertaken at Ganil, taking advantage of the powerful velocity filter LISE3 and the high intensity ECR ion sources. Some modifications were made to the velocity filter: - slits, a beam profiler and a Faraday cup were installed between its two identical halves –higher voltage power supplies were installed in order to accommodate experiments in reverse kinematics. A specific reaction chamber was built with large wheels (diameter: 60cm) rotating at 2000 RPM for targets and stripper foils, as well as smaller targets, oscillating stripper foils and elastic scattering target control. The detection chamber contains two MCP's for time-of-flight, two interchangeable implantation x-y Si detectors preceded by a Tunnel of 8 Si detectors and followed by a veto detector. The response, background and efficiency were checked with known reactions and decay chains (Sg isotopes): a background rejection factor of 2×10^{10} and an efficiency > 65 % were obtained.

Recently, a thin ionization chamber has been used in inverse kinematics reactions with a ^{208}Pb beam. The much larger kinetic energy pulse and the TOF provides a mass value. In addition, the IC signal allows us to get a nuclear charge value. Both values are rough but provide additional information on the implanted product. Indeed the identification of transfer products (actinides) through their alpha-chain is ambiguous when their half-life is so short that the alpha signal cannot be distinguished from the implantation signal. The charge signal make it possible to identify them. For a super-heavy nucleus, this direct information on the implanted residue strengthens much its identification via its decay chain. Work is in progress to extend this method to the case of usual kinematics with one single mylar foil: scintillation in a gas provides a signal proportional to the nuclear charge.

Results of planned experiments will be shown and discussed.